

The `lstbayes` package

Jeffrey B. Arnold
jeffrey.arnold@gmail.com

lstbayes from 2016/06/26

1 Introduction

This package provides language drivers for the `listings` package for the several Bayesian modeling languages: BUGS, JAGS, and Stan.

2 Usage

See the documentation of the `listings` package.

3 Implementation

```
1 \RequirePackage{listings}
```

3.1 BUGS

Language driver for BUGS, including WinBUGS and OpenBUGS. The driver is based on OpenBUGS v. 3.2.3.

```
2 \lstdefinlanguage{BUGS}{
3   morekeywords=[1]{for,in,model,T,I,C},%
4   morecomment=[1]{\#},%
5   sensitive=true,%
6   alsoletter={.},%
7   otherkeywords={<-,~},%
8   literate={<-}{\leftarrow}1 {~}{\sim}1%
9 }
10 \lstalias[] {OpenBUGS} [] {BUGS}
11 \lstalias[] {WinBUGS} [] {BUGS}
```

3.2 JAGS

Language driver for JAGS. The driver is based on JAGS version 3.4.0 (Sept 4, 2013).

```
12 \lstdefinlanguage[] {JAGS} [] {BUGS}{
```

```

13 morekeywords=[1]{data,var,const},%
14 morecomment=[n]{/*}{*/}%
15 }

```

3.3 Stan

Language driver for Stan. The driver is based on Stan modeling language version 2.10.0.

```

16 \lstdefinlanguage{Stan}{
17   morekeywords=[1]{functions,data,parameters,transformed,model,generated,quantities,%
18     for,in,while,print,if,else,lower,upper,increment_log_prob,T,return,%
19     reject,integrate_ode,integrate_ode_bdf,integrate_ode_rk45,target},%
20   morekeywords=[2]{int,real,vector,%
21     ordered,positive_ordered,simplex,unit_vector,%
22     row_vector,matrix,%
23     cholesky_factor_corr,cholesky_factor_cov,%
24     coor_matrix,cov_matrix,%
25     void},%
26   morekeywords=[3]{%
27     Phi,%
28     Phi_approx,%
29     abs,%
30     acos,%
31     acosh,%
32     append_col,%
33     append_row,%
34     asin,%
35     asinh,%
36     atan,%
37     atan2,%
38     atanh,%
39     bernoulli_ccdf_log,%
40     bernoulli_cdf,%
41     bernoulli_cdf_log,%
42     bernoulli_lccdf,%
43     bernoulli_lcdf,%
44     bernoulli_log,%
45     bernoulli_logit_log,%
46     bernoulli_logit_lpmf,%
47     bernoulli_logit_lpmf,%
48     bernoulli_lpmf,%
49     bernoulli_lpmf,%
50     bernoulli_rng,%
51     bessel_first_kind,%
52     bessel_second_kind,%
53     beta_binomial_ccdf_log,%
54     beta_binomial_cdf,%
55     beta_binomial_cdf_log,%
56     beta_binomial_lccdf,%

```

57 beta_binomial_lcdf,%
58 beta_binomial_log,%
59 beta_binomial_lpmf,%
60 beta_binomial_lpmf,%
61 beta_binomial_rng,%
62 beta_ccdf_log,%
63 beta_cdf,%
64 beta_cdf_log,%
65 beta_lccdf,%
66 beta_lcdf,%
67 beta_log,%
68 beta_lpdf,%
69 beta_lpdf,%
70 beta_rng,%
71 binary_log_loss,%
72 binomial_ccdf_log,%
73 binomial_cdf,%
74 binomial_cdf_log,%
75 binomial_coefficient_log,%
76 binomial_lccdf,%
77 binomial_lcdf,%
78 binomial_log,%
79 binomial_logit_log,%
80 binomial_logit_lpmf,%
81 binomial_logit_lpmf,%
82 binomial_lpmf,%
83 binomial_lpmf,%
84 binomial_rng,%
85 block,%
86 categorical_log,%
87 categorical_logit_log,%
88 categorical_logit_lpmf,%
89 categorical_logit_lpmf,%
90 categorical_lpmf,%
91 categorical_lpmf,%
92 categorical_rng,%
93 cauchy_ccdf_log,%
94 cauchy_cdf,%
95 cauchy_cdf_log,%
96 cauchy_lccdf,%
97 cauchy_lcdf,%
98 cauchy_log,%
99 cauchy_lpdf,%
100 cauchy_lpdf,%
101 cauchy_rng,%
102 cbrt,%
103 ceil,%
104 chi_square_ccdf_log,%
105 chi_square_cdf,%
106 chi_square_cdf_log,%

```

107     chi_square_lccdf,%
108     chi_square_lcdf,%
109     chi_square_log,%
110     chi_square_lpdf,%
111     chi_square_lpdf,%
112     chi_square_rng,%
113     cholesky_decompose,%
114     col,%
115     cols,%
116     columns_dot_product,%
117     columns_dot_self,%
118     cos,%
119     cosh,%
120     crossprod,%
121     csr_extract_u,%
122     csr_extract_v,%
123     csr_extract_w,%
124     csr_matrix_times_vector,%
125     csr_to_dense_matrix,%
126     cumulative_sum,%
127     determinant,%
128     diag_matrix,%
129     diag_post_multiply,%
130     diag_pre_multiply,%
131     diagonal,%
132     digamma,%
133     dims,%
134     dirichlet_log,%
135     dirichlet_lpdf,%
136     dirichlet_lpdf,%
137     dirichlet_rng,%
138     distance,%
139     dot_product,%
140     dot_self,%
141     double_exponential_ccdf_log,%
142     double_exponential_cdf,%
143     double_exponential_cdf_log,%
144     double_exponential_lccdf,%
145     double_exponential_lcdf,%
146     double_exponential_log,%
147     double_exponential_lpdf,%
148     double_exponential_lpdf,%
149     double_exponential_rng,%
150     e,%
151     eigenvalues_sym,%
152     eigenvectors_sym,%
153     erf,%
154     erfc,%
155     exp,%
156     exp2,%

```

157 exp_mod_normal_ccdf_log,%
158 exp_mod_normal_cdf,%
159 exp_mod_normal_cdf_log,%
160 exp_mod_normal_lccdf,%
161 exp_mod_normal_lcdf,%
162 exp_mod_normal_log,%
163 exp_mod_normal_lpdf,%
164 exp_mod_normal_lpdf,%
165 exp_mod_normal_rng,%
166 expm1,%
167 exponential_ccdf_log,%
168 exponential_cdf,%
169 exponential_cdf_log,%
170 exponential_lccdf,%
171 exponential_lcdf,%
172 exponential_log,%
173 exponential_lpdf,%
174 exponential_lpdf,%
175 exponential_rng,%
176 fabs,%
177 falling_factorial,%
178 fdim,%
179 floor,%
180 fma,%
181 fmax,%
182 fmin,%
183 fmod,%
184 frechet_ccdf_log,%
185 frechet_cdf,%
186 frechet_cdf_log,%
187 frechet_lccdf,%
188 frechet_lcdf,%
189 frechet_log,%
190 frechet_lpdf,%
191 frechet_lpdf,%
192 frechet_rng,%
193 gamma_ccdf_log,%
194 gamma_cdf,%
195 gamma_cdf_log,%
196 gamma_lccdf,%
197 gamma_lcdf,%
198 gamma_log,%
199 gamma_lpdf,%
200 gamma_lpdf,%
201 gamma_p,%
202 gamma_q,%
203 gamma_rng,%
204 gaussian_dlm_obs_log,%
205 gaussian_dlm_obs_lpdf,%
206 gaussian_dlm_obs_lpdf,%

```
207     get_lp,%
208     gumbel_ccdf_log,%
209     gumbel_cdf,%
210     gumbel_cdf_log,%
211     gumbel_lccdf,%
212     gumbel_lcdf,%
213     gumbel_log,%
214     gumbel_lpdf,%
215     gumbel_lpdf,%
216     gumbel_rng,%
217     head,%
218     hypergeometric_log,%
219     hypergeometric_lpmf,%
220     hypergeometric_lpmf,%
221     hypergeometric_rng,%
222     hypot,%
223     if_else,%
224     inc_beta,%
225     int_step,%
226     inv,%
227     inv_chi_square_ccdf_log,%
228     inv_chi_square_cdf,%
229     inv_chi_square_cdf_log,%
230     inv_chi_square_lccdf,%
231     inv_chi_square_lcdf,%
232     inv_chi_square_log,%
233     inv_chi_square_lpdf,%
234     inv_chi_square_lpdf,%
235     inv_chi_square_rng,%
236     inv_cloglog,%
237     inv_gamma_ccdf_log,%
238     inv_gamma_cdf,%
239     inv_gamma_cdf_log,%
240     inv_gamma_lccdf,%
241     inv_gamma_lcdf,%
242     inv_gamma_log,%
243     inv_gamma_lpdf,%
244     inv_gamma_lpdf,%
245     inv_gamma_rng,%
246     inv_logit,%
247     inv_phi,%
248     inv_sqrt,%
249     inv_square,%
250     inv_wishart_log,%
251     inv_wishart_lpdf,%
252     inv_wishart_lpdf,%
253     inv_wishart_rng,%
254     inverse,%
255     inverse_spd,%
256     is_inf,%
```

257 is_nan,%
258 lbeta,%
259 lchoose,%
260 lgamma,%
261 lkj_corr_cholesky_log,%
262 lkj_corr_cholesky_lpdf,%
263 lkj_corr_cholesky_lpdf,%
264 lkj_corr_cholesky_rng,%
265 lkj_corr_log,%
266 lkj_corr_lpdf,%
267 lkj_corr_lpdf,%
268 lkj_corr_rng,%
269 lmgamma,%
270 lmultiply,%
271 log,%
272 log10,%
273 log1m,%
274 log1m_exp,%
275 log1m_inv_logit,%
276 log1p,%
277 log1p_exp,%
278 log2,%
279 log_determinant,%
280 log_diff_exp,%
281 log_falling_factorial,%
282 log_inv_logit,%
283 log_mix,%
284 log_rising_factorial,%
285 log_softmax,%
286 log_sum_exp,%
287 logistic_ccdf_log,%
288 logistic_cdf,%
289 logistic_cdf_log,%
290 logistic_lccdf,%
291 logistic_lcdf,%
292 logistic_log,%
293 logistic_lpdf,%
294 logistic_lpdf,%
295 logistic_rng,%
296 logit,%
297 lognormal_ccdf_log,%
298 lognormal_cdf,%
299 lognormal_cdf_log,%
300 lognormal_lccdf,%
301 lognormal_lcdf,%
302 lognormal_log,%
303 lognormal_lpdf,%
304 lognormal_lpdf,%
305 lognormal_rng,%
306 machine_precision,%

307 max,%
308 mdivide_left_tri_low,%
309 mdivide_right_tri_low,%
310 mean,%
311 min,%
312 modified_bessel_first_kind,%
313 modified_bessel_second_kind,%
314 multi_gp_cholesky_log,%
315 multi_gp_cholesky_lpdf,%
316 multi_gp_cholesky_lpdf,%
317 multi_gp_log,%
318 multi_gp_lpdf,%
319 multi_gp_lpdf,%
320 multi_normal_cholesky_log,%
321 multi_normal_cholesky_lpdf,%
322 multi_normal_cholesky_lpdf,%
323 multi_normal_cholesky_rng,%
324 multi_normal_log,%
325 multi_normal_lpdf,%
326 multi_normal_lpdf,%
327 multi_normal_prec_log,%
328 multi_normal_prec_lpdf,%
329 multi_normal_prec_lpdf,%
330 multi_normal_rng,%
331 multi_student_t_log,%
332 multi_student_t_lpdf,%
333 multi_student_t_lpdf,%
334 multi_student_t_rng,%
335 multinomial_log,%
336 multinomial_lpmf,%
337 multinomial_lpmf,%
338 multinomial_rng,%
339 multiply_log,%
340 multiply_lower_tri_self_transpose,%
341 neg_binomial_2_ccdf_log,%
342 neg_binomial_2_cdf,%
343 neg_binomial_2_cdf_log,%
344 neg_binomial_2_lccdf,%
345 neg_binomial_2_lcdf,%
346 neg_binomial_2_log,%
347 neg_binomial_2_log_log,%
348 neg_binomial_2_log_lpmf,%
349 neg_binomial_2_log_lpmf,%
350 neg_binomial_2_log_rng,%
351 neg_binomial_2_lpmf,%
352 neg_binomial_2_lpmf,%
353 neg_binomial_2_rng,%
354 neg_binomial_ccdf_log,%
355 neg_binomial_cdf,%
356 neg_binomial_cdf_log,%

357 neg_binomial_lccdf,%
358 neg_binomial_lcdf,%
359 neg_binomial_log,%
360 neg_binomial_lpmf,%
361 neg_binomial_lpmf,%
362 neg_binomial_rng,%
363 negative_infinity,%
364 normal_ccdf_log,%
365 normal_cdf,%
366 normal_cdf_log,%
367 normal_lccdf,%
368 normal_lcdf,%
369 normal_log,%
370 normal_lpdf,%
371 normal_lpdf,%
372 normal_rng,%
373 not_a_number,%
374 num_elements,%
375 ordered_logistic_log,%
376 ordered_logistic_lpmf,%
377 ordered_logistic_lpmf,%
378 ordered_logistic_rng,%
379 owens_t,%
380 pareto_ccdf_log,%
381 pareto_cdf,%
382 pareto_cdf_log,%
383 pareto_lccdf,%
384 pareto_lcdf,%
385 pareto_log,%
386 pareto_lpdf,%
387 pareto_lpdf,%
388 pareto_rng,%
389 pareto_type_2_ccdf_log,%
390 pareto_type_2_cdf,%
391 pareto_type_2_cdf_log,%
392 pareto_type_2_lccdf,%
393 pareto_type_2_lcdf,%
394 pareto_type_2_log,%
395 pareto_type_2_lpdf,%
396 pareto_type_2_lpdf,%
397 pareto_type_2_rng,%
398 pi,%
399 poisson_ccdf_log,%
400 poisson_cdf,%
401 poisson_cdf_log,%
402 poisson_lccdf,%
403 poisson_lcdf,%
404 poisson_log,%
405 poisson_log_log,%
406 poisson_log_lpmf,%

407 poisson_log_lpmf,%
408 poisson_log_rng,%
409 poisson_lpmf,%
410 poisson_lpmf,%
411 poisson_rng,%
412 positive_infinity,%
413 pow,%
414 prod,%
415 qr_Q,%
416 qr_R,%
417 quad_form,%
418 quad_form_diag,%
419 quad_form_sym,%
420 rank,%
421 rayleigh_ccdf_log,%
422 rayleigh_cdf,%
423 rayleigh_cdf_log,%
424 rayleigh_lccdf,%
425 rayleigh_lcdf,%
426 rayleigh_log,%
427 rayleigh_lpdf,%
428 rayleigh_lpdf,%
429 rayleigh_rng,%
430 rep_array,%
431 rep_matrix,%
432 rep_row_vector,%
433 rep_vector,%
434 rising_factorial,%
435 round,%
436 row,%
437 rows,%
438 rows_dot_product,%
439 rows_dot_self,%
440 scaled_inv_chi_square_ccdf_log,%
441 scaled_inv_chi_square_cdf,%
442 scaled_inv_chi_square_cdf_log,%
443 scaled_inv_chi_square_lccdf,%
444 scaled_inv_chi_square_lcdf,%
445 scaled_inv_chi_square_log,%
446 scaled_inv_chi_square_lpdf,%
447 scaled_inv_chi_square_lpdf,%
448 scaled_inv_chi_square_rng,%
449 sd,%
450 segment,%
451 sin,%
452 singular_values,%
453 sinh,%
454 size,%
455 skew_normal_ccdf_log,%
456 skew_normal_cdf,%

457 skew_normal_cdf_log,%
458 skew_normal_lccdf,%
459 skew_normal_lcdf,%
460 skew_normal_log,%
461 skew_normal_lpdf,%
462 skew_normal_lpdf,%
463 skew_normal_rng,%
464 softmax,%
465 sort_asc,%
466 sort_desc,%
467 sort_indices_asc,%
468 sort_indices_desc,%
469 sqrt,%
470 sqrt2,%
471 square,%
472 squared_distance,%
473 step,%
474 student_t_ccdf_log,%
475 student_t_cdf,%
476 student_t_cdf_log,%
477 student_t_lccdf,%
478 student_t_lcdf,%
479 student_t_log,%
480 student_t_lpdf,%
481 student_t_lpdf,%
482 student_t_rng,%
483 sub_col,%
484 sub_row,%
485 sum,%
486 tail,%
487 tan,%
488 tanh,%
489 tcrossprod,%
490 tgamma,%
491 to_array_1d,%
492 to_array_2d,%
493 to_matrix,%
494 to_row_vector,%
495 to_vector,%
496 trace,%
497 trace_gen_quad_form,%
498 trace_quad_form,%
499 trigamma,%
500 trunc,%
501 uniform_ccdf_log,%
502 uniform_cdf,%
503 uniform_cdf_log,%
504 uniform_lccdf,%
505 uniform_lcdf,%
506 uniform_log,%

```

507     uniform_lpdf,%
508     uniform_lpdf,%
509     uniform_rng,%
510     variance,%
511     von_mises_log,%
512     von_mises_lpdf,%
513     von_mises_lpdf,%
514     von_mises_rng,%
515     weibull_ccdf_log,%
516     weibull_cdf,%
517     weibull_cdf_log,%
518     weibull_lccdf,%
519     weibull_lcdf,%
520     weibull_log,%
521     weibull_lpdf,%
522     weibull_lpdf,%
523     weibull_rng,%
524     wiener_log,%
525     wiener_lpdf,%
526     wiener_lpdf,%
527     wishart_log,%
528     wishart_lpdf,%
529     wishart_lpdf,%
530     wishart_rng
531 },%
532 otherkeywords={<-,~,+=,=},%
533 sensitive=true,%
534 morecomment=[l]{\#},%
535 morecomment=[l]{//},%
536 morecomment=[n]{/*}{*/},%
537 string=[d]"%,
538 literate={<-}{\leftarrow$}1 {~}{\sim$}1%
539 }

```

Change History

2015-09-26	General: Converted to DTX file . . . 1	2015-09-28	General: Fix README. Add key-
2015-09-27	General: Fix README 1		words for all built-in functions
			that are in Stan v2.8.0. 1

Index

Numbers written in *italic* refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; numbers in *roman* refer to the code lines where the entry is used.

Symbols

$\backslash\#$ 4, 534 12

	L		..... 2, 12, 16		S
<code>\leftarrow</code>	.....	8, 538		<code>\sim</code>	..... 8, 538
<code>\lstalias</code>	.....	10, 11	R		
<code>\lstdefinlanguage</code>	.		<code>\RequirePackage</code>	.....	1